



## List of Modules and Courses

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## e-Business Application Developer Course Descriptions

### e-Business Application Developer Roadmap

Course Title	Hours per module	Hours
<b><u>IT Foundations</u></b>		
Introduction to program for eb Appl Dev		2
Introduction to PCs & MS Windows		12
MS Word 2000 Fundamentals		8
MS Excel 2000 Fundamentals		8
MS Powerpoint Fundamentals		8
MS Word 2000 Intermediate		8
MS Excel 2000 Intermediate		8
Computer Architecture and Operating Systems Concepts		28
Linux Basics		26
Internet Fundamentals		12
eAD Assessment Test # 1 (Intro to Program, IPCW, CAOS, LINUX, INTERF)		2
	122	
<b><u>Programming Fundamentals</u></b>		
Programming Fundamentals		16
Introduction to Programming with C		56
Data Structures and Algorithms		32
eAD Assessment Test # 2 (PgmF, C, DSA)		2
RDBMS Concepts and SQL		32
Networking Essentials		16
eAD Assessment Test # 3 (RDBMS, NWESS)		2
	156	
<b><u>OO, Java, and DB Programming</u></b>		
Object Oriented Programming with C++		60
eAD Assessment Test #4 (OOC, CPROG)		2
Core Java		88
eAD Assessment Test # 5 (JAVA)		2
DB Programming & Stored Procedures		40
Software Engineering		24
OO Analysis and Design using UML		16
Web Programming 1 (HTML, JavaScript)		24
Web Programming 2 (ASP, CGI, VBScript)		32
Project #1 ebAD		32
eAD Assessment Test # 6 (DB2PGM, SWENG, OOAD, WP1, WP2)		2
	322	
<b><u>Enterprise Application Development</u></b>		
e-business Technology Fundamentals		16
e-Commerce Strategies and Practices (Lecture Only)		18
Enterprise Java I (Servlets and JSPs)		64
eAD Assessment Test # 8 (EbFund, ECS&P, EJAVA1)		2
Enterprise Java II (EJBs)		38
Enterprise Appl Dev using XML		44
e-business Security **		16
Project #2 ebAD		40
eAD Assessment Test # 9 (EJAVA2, EBSEC)		2
	240	
		<b>840</b>

\*\* Available in late 2003

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**Module 1 – IT Foundations**

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***Introduction to e-Business Application Developer Program (CY140) - AVAILABLE IN LATE 2003*****Duration**

The duration of the course is 8 hours

**Purpose**

This course introduces the students to the ACE program for e-Business Application Developers. It is important for students to have an understanding of what skills they will learn in this program and what job they will be qualified to do when they complete the program. This course will provide an in-depth overview of this information so students will be motivated to continue in program

**Audience**

ACE Students starting the e-business Application Developer Career program

**Prerequisites**

None

**Objectives**

The objectives of this introductory course are to:

- Review the roadmap for this ACE program
- Explain the reason for each course to be included in the program
- Discuss the potential jobs that this program will prepare the students to do
- Give the students an opportunity to view a very simple program and make a change to the program in order to have an idea of what a programmer does

**Agenda**

Each unit in this course is two hours in duration.

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***Introduction to PCs and Windows 2000 (CY110) V2*****Duration**

The duration of the course is 12 hours.

**Purpose**

The aim of the course is to provide the student with an overview of a computer and its organization. It introduces the various computer components, its peripherals – input and output devices. The course discusses the different types of computers, the basic concepts of hardware and software, and also the basics of computer networking.

The course introduces the concept of an operating system through Windows 2000. Students will get familiarized to the use of files and folders, and operations performed on them. They will also learn the use of multiple files and folders, as well as command prompts and their usage.

The course introduces the students to Editors, which are an important part of any activity on a system. Customizing Windows 2000 aids the user of the system to work with the system in the way he/she wants. The course guides the student through the concepts with the help of simple examples.

This course, Introduction to PCs and Windows 2000, incorporates adequate Lab sessions, where the students will be able to gain practical experience.

**Audience**

Students, professionals, and developers who wish to know about personal computers and to work with MS Windows

**Objectives**

After completing this course, you will be able to:

- Describe the various components of a computer, its peripherals, and its organization.
- Discuss the characteristics of the various components in a computer, and understand the connection between one another.
- Identify various Windows components and perform various Windows activities.
- Work with files and folders, and get familiar to perform operations on them.
- Work with multiple files and folders.
- Use menus and toolbars, and perform text-editing operations.
- Customize Windows 2000, starting with the basics.
- Perform operations like move, resize, and hide taskbar.
- Edit text by performing operations like cutting, copying and pasting.
- Execute operations like open, save and print a file, and work with the formatting commands.
- Personalize menus and create shortcuts to the desktop.
- Discuss disk error repair and defragmentation.
- Install and uninstall software.

**Prerequisites**

None

**Agenda**

Each unit in this course is one hour in duration.

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**Computer Architecture and Operating Systems (CY340) – V2****Duration**

The duration of the Course is 28 hours.

**Purpose**

The aim of the course is to introduce the student to Computer Architecture and various concepts in operating systems. The aim of the course is to familiarize students with the operations that take place in a computer system. The course deals with the components in a computer, various architectures, and memory.

The first part of the course provides an overview on computer systems and its variations, the characteristics of processors, digital circuits, and the nature of equivalent, combinational and sequential circuits. Students will also be able to understand how number systems evolved, and the number systems used by computer systems. They will also learn how real numbers are represented in a binary system, and about the various number systems that are understood by computers.

The second part of the course introduces the student to the organization of the central processing unit (CPU) and memory. It provides an overview on Microprogramming, machine language and Input/Output organization. Students will learn about the principles and objectives of I/O software, and about device management. They will also get familiarized with RISC and CISC architecture.

The third part of the course deals with the concepts in operating systems and provides an overview on systems programming. Students will learn about virtual machines and language processors, and its different phases. Operating systems will be dealt with, in detail, in this part of the course. Students will also learn about resource abstraction, multitasking, process management and its objectives, memory, file, and device management.

**Audience**

Students, professionals, and developers who wish to know about the architecture of a computer and concepts about operating systems.

**Prerequisites**

None

**Objectives**

After completing this course, you will be able to:

- Explain the organization of computer systems.
- State the characteristics of various digital circuit elements.
- Understand the usage of Boolean algebra in constructing digital circuits.
- Discuss the evolution of number systems, and explain the number systems used by computers.
- Explain the organization of central processing units.
- List the principles of Input/Output hardware and devices.
- Get familiarized with device management.
- Explain various systems software, and language processors.
- Discuss operating systems and their functional aspects.
- Explain the concepts involved in multiprogramming, time-sharing and multi-tasking.
- List the aspects involved in process management, and process scheduling.
- Define the objectives of memory management and the various types of memory management schemes used in operating systems.
- Understand the fundamentals of file management and the necessity for file management systems.
- Classify devices, and discuss device management.

**Agenda**

Each unit in this course is one hour in duration.

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**LINUX Basics (CY310)****Duration**

The duration of the course is 26 hours

**Purpose**

This course offers students an overview of the Linux operating system. The first part of the course introduces some of the preliminary concepts of Linux as an OS with increasing popularity. Students will be able to learn the basic commands of the Linux System, its structural organization and file systems. They will also learn to create directories and files and manage them. The course also provides an overview of the vi editor – one of the most widely used editors on Linux.

The second part of the course gives a description of the Linux shell, one of the prime components that a user interacts with, along with simple commands of shell. Students will finally learn about the concepts of Linux processes. The course also describes methods by which the Linux environment could be customized to suit individual needs.

The course on Linux Basics incorporates several Lab sessions where students would be able to gain practical experience on Linux.

**Audience**

Students, Professionals, and Business people

**Prerequisites**

None

**Objectives**

After completing this course, you should be able to:

## e-Business Application Developer Course Descriptions

- Explain an operating system
- Discuss the evolution of Linux, and its hardware requirements
- Describe the organization of the Linux operating system
- Provide an overview of the Linux shell
- Discuss Linux's capability to process text, program and provide documentation for commands
- Explain the log in / log out procedure on a Linux operating system
- Discuss the use of the command format of Linux
- Explain the use of some basic Linux commands
- Discuss the usage of pipes and filters

### Agenda

Each unit in this course is two hours in duration.

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### ***Internet Fundamentals (CY170) V2***

#### **Duration**

The duration of the course is 8 hours

#### **Purpose**

Internet Fundamentals is a 6-hour course designed to guide students through the Internet and its wide array of useful resources. Students learn how to use key Internet technologies, such as Web browsers, e-mail, newsgroups, File Transfer Protocol (FTP), Telnet, and search engines. Students gain experience configuring both Netscape Navigator and Microsoft Internet Explorer to access rich multimedia, including RealPlayer, Shockwave and Flash content. Students also use a variety of Web-based search engines to conduct advanced searches and learn the basics of electronic commerce and security issues.

#### **Audience**

Students, Professionals, and Business people

#### **Prerequisites**

No experience using the Internet is necessary. An understanding of Microsoft Windows 95/98/2000 is required.

#### **Objectives**

Overview of the Internet  
Browsing the World Wide Web  
Electronic Mail  
FTP, Newsgroups and Telnet  
Objects, Plug-ins, and Viewers  
Search Engines  
Security  
E-Commerce

#### **Agenda**

Each unit in this course is one hour in duration.

## Module 3 – Programming Fundamentals

### *Programming Fundamentals (CY300)*

**Duration**

The duration of the course is 16 hours.

**Purpose**

If you are just starting out as a programmer and need an introduction to the basics of programming, you will learn the elements of the development process for mainframe applications. This course covers program and data structures and the number of systems used in this environment. You will learn the components of a mainframe configuration, understand hexadecimal and binary number systems and the standard elements of a host application program.

**Audience**

Anyone who wants a basic knowledge in the fundamentals of programming.

**Prerequisites**

None.

**Objectives**

After completing this course, students will be able to create functional Web pages using HTML

- Create basic program logic.
- Recognize the steps necessary to go from program design to execution.
- Use binary and hexadecimal notation and in traditional mainframe environments.
- Describe the various components of a mainframe configuration.

**Agenda**

Each unit in this course is two hours in duration.

### *Introduction to Programming Using C (CY320) – V2*

**Duration**

The duration of the course is 56 hours

**Purpose**

The purpose of this course is to help you develop excellent programming skills in C. To this end, this course provides detailed information about the various elements of C. The basic objective is to give you a very strong foundation in C concepts and programming. The course starts off with an introduction to the basic concepts of computing, from algorithms through a definition of a program to programming languages and compilers.

By the time you are through with the course, you will be conversant with the use of important constructs in C like the different types of the if statement, the switch construct, the scanf function, etc. You will also be well versed in the use of iterative constructs in solving problems in C. You will be able to use iterative constructs like the for statement and the while statement. You will also be introduced to the concept of arrays in C, and will learn to use the different kinds of arrays for solving problems. As the course progresses, you will learn about structures and unions in C. You will also be introduced to the concepts of functions, recursion, pointers, file handling, handling command line arguments, learn about the enumeration data type, and also how to use macros.

Along with these intense theory sessions, you will also have lab. sessions, where you can practice all that you have learnt in the classroom and hone your skills in C.

**Audience**

Individuals interested in learning to program in the C language.

**Prerequisites**

To be able to understand the concepts dealt with in this course, you should have prior knowledge about Operating Systems. An understanding of the working of an operating system like Linux is very essential for you to be able to make full use of this course.

**Objectives**

At the end of this course you should be able to:

- Gain an overview of the basic computer concepts like a program, programming languages, compilers, algorithms etc.
- Use the different kinds of if statements in the problem-solving effort
- Employ the switch construct to write programs C
- Write programs using the printf and the scanf functions of C
- Solve problems using the concept of arrays
- Employ the concept of structures in solving problems
- Define the enumeration data type and utilize it in the problem solving effort
- Define recursion in C
- Define the concept of a union and use it to solve problems in C
- Work with macros in C
- Work with the concept of file handling in C
- Handle command line arguments in C programs

**Agenda**

Each unit in this course is two hours in duration.

**Data Structures and Algorithms (CY330) – V2****Duration**

The duration of the Course is 32 hours

**Purpose**

The aim of the course is to introduce the student to data structures and algorithms used in computing systems. The first part of the course provides an overview of data types and data structures, linked lists, stacks, and queues.

Students will get familiarized with the role of data structures in solving problems and applications using list data structure. Students will learn about the need for linked lists and implementation of lists as arrays. They will also learn about abstract data type stack and the application of stacks. This course also deals with the implementation of queues as arrays and applications of queues.

The second part of the course deals with graphs as data structures, set representation of graphs and applications of graphs. Students will learn about trees as a data structure and traversal methods for a binary tree. Students will also get familiarized with sorting techniques and searching techniques.

The course includes several practical sessions to help students get acclimatized to the topics learnt in the course.

**Audience**

Individuals with few programming skills who need an understanding of database and algorithms. This course provides each participant with an understanding of the role of data structures and algorithms as building blocks in most computer programs.

**Prerequisites**

- Understanding of basic programming concepts
- Overview of general features of a programming language
- Problem solving using C programming language
- Practical experience in using advanced features of C like pointers and files
- These skills can be obtained by completing the following course CY320 : Introduction to programming with C

**Objectives**

After completing this course, you should be able to:

- Define data types and data structures
- Discuss the need for linked lists
- Understand the difference between array and linked implementation of a list
- Explain the stack data structure
- State the applications of stacks
- State the definition of abstract data types queue and implement a queue using an array
- Define graphs and their applications
- Define tree as a data structure and discuss binary trees
- Explain the various sorting techniques
- State the various search techniques and discuss hash tables as an enabling data structure

**Agenda**

Each unit in this course is two hours in duration.

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**RDBMS Concepts and SQL (CY350) – V2****Duration**

The duration of the course is 32 hours.

**Purpose**

The aim of this course is to introduce the student to the concepts of Relational Database Management Systems (RDMS) and Structured Query Language (SQL). The course provides an overview of the database design and its advantages. The course discusses conceptual database models and, recursive and exclusive relationships pertaining to database design. This course will also provide an understanding of the concepts of normalization and normal forms in relational databases.

The second part of the course deals with SQL in detail. It offers an overview of data tables, aggregate functions, and the parent-child relationship in SQL. Students will also get an introduction to Advanced SQL in this part of the course.

The third part of the course deals with DB2 fundamentals. Students will be able to understand the creation and management of database objects. The course also explains concepts such as, database dictionary, database access and security. The course also provides several Lab. exercises to improve the practical skills of students in database management.

**Audience**

Anyone interested in learning relational database overall concepts, access and management and product samples.

**Prerequisites**

CY340

**Objectives**

After completing this course, you will be able to:

- Discuss the concepts of RDMS.
- Understand the database design process, and the conceptual model.
- Define normalization and understand the need for normalization.
- Discuss SQL and data tables.

## **e-Business Application Developer Course Descriptions**

- Get familiar with advanced SQL and its concepts, such as, primary and foreign keys.
- Understand DB2 fundamentals and its capabilities.
- Learn to create and manage database objects.
- Discuss data types and column definitions.
- Learn about database access and security concepts.

### **Agenda**

Each unit in this course is two hours in duration.

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### ***Networking Essentials (CY360) V2***

#### **Duration**

The duration of the Course is 16 hours

#### **Purpose**

The aim of this course is to introduce the student to computer networking. The course provides an overview of the components of a network and the different types of data communication networks. The course discusses protocol suites and the concept of internetworking.

In the first part of the course, students will learn about Internet Protocol (IP), the concept of IP addresses and Internet datagrams. They will also learn about Transmission Control Protocol (TCP), TCP operations and application layer protocols. Sockets and remote procedure calls are also discussed.

The second part of the course relates to network handling. Students will learn about network devices and get familiarized with the fundamentals of network management. The course also discusses the issues of data management, protection and disaster planning.

#### **Audience**

Students, professionals, and developers who wish to know about the basics of networking.

#### **Prerequisites**

None

#### **Objectives**

After completing this course, you should be able to:

- Describe the benefits of networks and the various types of data communication networks
- Discuss protocol suites and the ISO-OSI model
- Describe IP and IP addresses
- Define TCP and TCP operations
- State the various levels of management protocol and describe the Internet protocol suite
- Discuss sockets and remote procedure calls
- Get familiar with network devices such as repeaters, bridges and routers
- Discuss the fundamentals of network management and the issues of network security
- Acquire an understanding of network security models

#### **Agenda**

Each unit in this course is two hours in duration.



## Module 4 – Object Oriented, Java, and Database Programming

### **Object Oriented Programming Using C++ (CY410) V2**

#### **Duration**

The duration of the Course is 60 hours

#### **Purpose**

The first volume of this course provides an overview of object-oriented concepts. Students will get to learn about programming paradigms, polymorphism, and the advantages of the object-oriented development system. They will also learn about classes and objects, methods, and messages. The concept of abstract classes, identification of classes, and assigning responsibilities are also covered extensively.

The second volume of the course deals with C++ terminologies and teaches students about compiling C++ programs. It also deals with member functions, message passing, and dynamic object creation and destruction. Students will get familiarized with friend classes, nested classes, static functions, and the concept of inheritance. They will also learn about access restrictions and inheritance, constant data, and member functions.

The third volume of the course introduces polymorphism, dynamic binding, virtual functions, and virtual destructors. Students will learn about operator overloading in detail. They will also learn about multiple inheritance and Run-Time Type Information (RTTI).

The fourth volume of the course deals with templates, static members and variables, raising and handling exceptions. It provides an overview of working with templates and the Standard Template Library (STL). It also teaches students about derived exceptions and handling exceptions of similar type.

The fifth and the final volume of the course deals with the concept of input and output. Students will get familiarized with input streams, output streams, and file streams. The course also provides an overview of input/output on user-defined classes. It explains the input and output of user-defined data types.

The course incorporates several Lab. sessions where students would be able to gain practical experience in object-oriented programming in C++.

#### **Audience**

This course is designed for Web and Application developers.

#### **Prerequisites**

Introduction to Programming with C (CY320), Data Structures and Algorithms (CY330)

#### **Objectives**

After completing this course, you will be able to:

- Describe and list the benefits of object-oriented technology
- Discuss abstraction, aggregation, inheritance, and polymorphism
- Describe classes and objects and their use in object-oriented systems
- Use classes, objects, and messages in a practical situation
- Use CRC cards as a first step towards object-oriented analysis
- Apply the principles of CRC card design
- Describe the terminologies used in C++
- Compile C++ programs on the Linux operating system
- Define a class and instantiate an object of a class
- Discuss the order of construction and destruction of objects
- Describe the need for and use of static members in a class
- Create a class in C++
- Discuss how C++ deals with inheritance
- Explain the concepts of overloading and overriding with respect to inheritance
- Work with the restrictions imposed on inheritance
- Discuss constant data and member functions
- Pass class objects by reference
- Write codes that handle constants in function calls
- List the types of polymorphism and examine the use of virtual functions in implementing polymorphism
- Describe the nature of pure virtual functions and their usage
- Discuss the mechanism behind overloading and function selection
- Deal with the methods of operator overloading
- Work with overload operators for a user-defined class
- Define public and private inheritance and discuss repeated inheritance
- Create derived classes out of more than one base class
- Explain the need for templates in programming
- List the differences between inheritances and templates
- Apply generic function templates on different data types
- Use inheritance with templates
- Describe the ways in which working with templates is made better
- Describe exception handling in C and C++
- Declare the exception throwing functions
- Explain the creation of exceptions

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- Describe the grouping of exceptions and work with derived exceptions
- Define manipulators and describe the file input/output streams
- Work with input on user-defined data types
- Explain how output on user-defined data types are performed
- Describe the look and feel properties of Swing
- Discuss the Java 2D API

### Agenda

Each unit in this course is two hours in duration.

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### Core Java (CY420) V2

#### Duration

The duration of the course is 88 hours.

#### Purpose

This course offers students an overview of Core Java. The first volume of the course deals with Java basics, the impact of Java on the World Wide Web, object orientation in Java, operators and control structures. Students will learn about Java features, naming conventions, variable declaration and initialization.

The second volume of the course deals with object-oriented programming. It provides an overview of members of a Java class, usage of class methods, and memory management in Java. Students will learn about the basics of inheritance, the basics of abstract classes and methods and interfaces. They will also learn about commonly used in-built packages of Java.

The third volume of the course deals with exceptions, the methods of raising exceptions. Students will learn how to differentiate between checked and unchecked exceptions. They will also learn about how user-defined exceptions can be created and used.

The fourth volume of the course provides an overview of Input/Output facilities. It deals with files and streams, character streams, the reader and writer classes and random access files. It also deals with object serialization, the serializable interface and the externalizable interface. Students will also learn about the ObjectOutputStream class and the ObjectInputStream class.

The fifth volume of the course provides an overview of user interfaces using AWT. It deals with AWT classes and containers, painting and updating user interface components. It also deals with sample methods inherited by AWT components from component and container Classes. Students will learn about layout managers, the process of creating a layout manager and associating it to a container. They will also learn about the event delegation model and event handling.

The sixth volume of the course provides an overview of applets. It deals with the life cycle of an applet, testing of applets, loading an applet, drawing and event handling methods. Students will learn about concepts such as using the applet API, locating and loading data files, displaying documents in a browser, communicating with other applets, and security restrictions on applets.

The seventh volume of the course provides an overview of multithreading and networking. It deals with the lifecycle of threads, creating and running threads, sub-classing from thread class, and implementing the runnable interface. It also deals with thread synchronization, synchronized methods and statements, and inter-thread communication. Students will learn about working with URLs and socket programming, connection-oriented classes in Java, receiving and sending datagrams.

The eighth volume of this course provides an overview of the collections API. It deals with the Java collections framework, collection interfaces and implementations. It introduces database connectivity in Java and SQL statements used in Java programs and the steps involved in database access. Students will learn about stored procedures, transaction management, cursor support, multiple result set processing, and other functionalities of JDBC. They will also learn about reflection API, examining classes, and manipulating objects of a class. Advanced features such as images and graphics, security issues while working with Java programs, Java beans and internationalization concepts in Java are also dealt with.

The ninth volume of this course provides an overview of Java foundation classes. It deals with MVC architecture and Swing classes, the difference between AWT and Swing, Swing components, Java 2D API and 2D rendering. Students will learn about graphics 2D rendering methods, coordinate systems, shapes, fonts and images.

The course incorporates several Lab sessions where students would be able to gain practical experience on Core Java concepts.

#### Audience

This course is designed for Web and Application developers.

#### Prerequisites

CY410, CY350

#### Objectives

After completing this course, you should be able to:

- Discuss the main features of Java
- Explain the principles of object-orientation in Java
- Explain various control structures used in Java
- Discuss the need for and use of constructors for a class
- Describe the memory management is performed in Java
- Describe how to create an inheritance hierarchy
- Define and explain how to implement an interface

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- Explain classpath variables and describe its usage
- Discuss exceptions and the traditional error handling techniques
- Describe exception handling in Java
- Examine different ways in which exceptions can be thrown, caught, and handled
- Discuss the File class
- Explain the various character streams and byte streams
- Discuss the Serializable interface and the ObjectOutputStream class
- Describe some useful classes and some GUI components in AWT
- Discuss how to choose a layout manager and its responsibilities
- Explain how to implement the event delegation mechanism
- Distinguish an applet from an application
- Describe methods for adding UI components
- Discuss advantages of the Applet API
- Explain the concepts of threads and multithreading
- Discuss how to create threads from the Thread class and Runnable interface
- Describe the concept of synchronization
- Explain synchronized methods and statements
- Discuss URLs and URL exceptions
- Discuss connection-oriented and connectionless sockets
- Discuss collection interfaces
- Describe the polymorphic algorithms of JDK operating on collections
- Discuss the JDBC API
- Explain exception handling in JDBC
- Explain the use of PreparedStatement and CallableStatement in JDBC
- Discuss some of the JDBC support classes in Java
- Discuss the manipulation of objects of a class
- Discuss security issues while working with Java programs
- Discuss the packaging of Java components
- Describe the MVC architecture
- Discuss layout managers defined in Swing

### Agenda

Each unit in this course is two hours in duration.

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## Database Programming and Stored Procedures (CY430) V1

### Duration

The duration of the course is 40 hours.

### Purpose

The aim of the course is to introduce students to database technologies. The first part of the course provides an overview of database applications, DB2 programming fundamentals and JDBC and SQLJ programming. It also covers application packages, triggers and embedded SQL concepts. Students will learn to use the syntax of SQLJ and write applets and applications using SQLJ.

The second part of the course deals with DB2 stored procedures. It provides an overview of stored procedure concepts, control flow statements, application logic and error handling. Students will learn how to develop SQL/PL stored procedures and to debug programs using stored procedure builder. They will also learn about coding stored procedures in Java.

The third part of the course deals with User Defined Types, User Defined Functions and large objects. Students will learn about UDF programming in Java and about data operations on large objects.

The last part of the course deals with advanced RDBMS concepts. Students will learn about concurrency control, classification of failures and backup methods. They will also learn about different database systems and the distributed transaction model.

The course includes several practical sessions to help students get acclimatized to the topics learnt.

### Audience

This course is designed for Database application designers and database application programmers supporting DB2 stored procedures with the SQL database language.

### Prerequisites

CY360, CY420

### Objectives

After completing this course, you should be able to:

- Explain database applications and describe DB2 programming fundamentals
- Understand Java programs and applets that interact with DB2
- Group applications into Logical Units of Work
- Explain the concept of triggers and how to use them with various database objects
- Analyze embedded SQL concepts and discuss SQLJ syntax
- Explain the need for stored procedures, and where to use them
- Explain how to build stored procedures using SQL/PL
- Write stored procedures using SQL/PL, build the programs, and register them with DB2

## e-Business Application Developer Course Descriptions

- Explain how to develop stored procedure servers in Java
- Explain the concepts of UDT and UDF
- Work with table functions
- Provide an overview of concurrency control and the database recovery process
- Briefly state the validation-based protocols and provide a brief classification of failures
- Describe decision support systems and transaction management

### Agenda

Each unit in this course is two hours in duration.

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### Software Engineering (CY440) V2

#### Duration

The duration of the course is 24 hours.

#### Purpose

This course offers students an overview of Software Engineering, with the first part covering Fundamentals, Analysis, and Design. It deals with types of software applications, categories of software process models, requirements engineering, data flow oriented analysis and handling real-time systems. Students will learn about the factors affecting software design approaches and software architecture. They will also learn about structured programming concepts and deriving a structure chart from DFDs.

The second part of the course provides an overview of Metrics, Quality, and Testing. Complexity-related metrics, object oriented metrics and cost estimation models. Students will learn about risk management, software project scheduling, software quality operations, formal technical reviews, quality assurance systems and the capability maturity model. The course also provides an overview of the techniques of software testing, verification and validation of software and the testing process.

The course incorporates several lab sessions where students would be able to gain practical experience in software engineering

#### Audience

This course is designed for application designers and developers

#### Prerequisites

- Knowledge of programming
- Coding of applications using one or more programming languages

#### Objectives

After completing this course, the student should be able to

- Define software engineering, and explain its importance
- Discuss the merits and demerits of various software process models
- Define software requirements
- Describe the requirements analysis activities
- Describe the functions and components, of an SRS
- Explain the method of data flow oriented analysis
- Explain the nature of the symbolic language used to make entries in data dictionaries
- Develop context level DFD from the requirements description
- Discuss some of the different types of software metrics, such as size-oriented metrics, function-oriented metrics, and extended function-point metrics
- Discuss the various activities that encompass risk analysis
- Discuss software project planning and scheduling
- Describe quality control and quality assurance in the context of software
- Describe the ISO 9000 process as a quality assurance system
- Discuss different levels of testing
- Discuss the process of deriving test cases
- Explain the methods involved in the unit testing process
- Discuss the approaches involved in integration testing
- Describe the different constituents of system testing

### Agenda

Each unit in this course is two hours in duration.

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### OO Analysis and Design Using UML (CY440) V2

#### Duration

The duration of the course is 16 hours.

#### Purpose

This course offers students an overview of Object Oriented Fundamentals and the Unified Modeling Language. The first part of the course deals with class diagrams, relationships between classes and working with Class diagrams. It also covers classifiers, template classes, roles and types, packages, object diagrams and working with them.

The second part of the course provides an overview of use cases, activity diagrams, state machines, statechart diagrams and active classes. Students will learn about components, collaborations, design and architectural patterns, and working with collaborations, component and deployment diagrams. The course also deals with testing, the implications of inheritance on testing, the levels of object oriented testing and testing in the unified software development process.

## e-Business Application Developer Course Descriptions

The course incorporates a couple of Lab sessions where students would be able to gain practical experience on object-oriented analysis and design.

### Audience

Any individual involved in using Object Technology to analyze and design applications including project managers, architects, designers, analysts, and developers

### Prerequisites

- Understanding basic concepts about object orientation
- Ability to distinguish between classes, and objects
- Capability to differentiate messages from methods
- Practical experience in programming using an object-oriented language
- These skills can be obtained by completing the following courses CY410 : Object-Oriented Programming with C++ or CY420 : Core Java

### Objectives

On completing this course, students should be able to:

- List various object-oriented principles
- Work with the Unified Modeling Language
- Discuss the interfaces, types, roles and packages
- Construct object diagrams
- Define interactions, use cases and activity
- Define state machines and construct statechart diagrams
- Discuss about component diagrams
- Differentiate between systems and subsystems
- Examine the basic unit of testing in object-oriented systems
- Describe testing in the Unified Development Process

### Agenda

Each unit in this course is two hours in duration.

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## Web Programming 1 (HTML, JavaScript) (CY710)

### Duration

The duration of the course is 24 hours.

### Purpose

This course is designed to teach students how to use Hypertext Markup Language (HTML) to design and create fully functioning Web pages. Students will learn how to use HTML tags, attributes and links for a basic, but thorough, understanding of HTML Authoring. It also teach JavaScript, Java Objects and how to intercommunicate between JavaScript and Java applets

### Audience

This course is designed for students interested in learning the basic skills required to create Web pages

### Prerequisites

Students must have completed Internet Fundamentals or have equivalent Internet knowledge and be proficient in Hypertext Markup Language (HTML) authoring. Students attending this course should be familiar with OO Programming and Java.

### Objectives

After completing this course, students will be able to create functional Web pages using HTML/Java Script and how to use JavaScript methodology in client-side applications

Booklet 1: Hypertext Markup Language (HTML)

Unit 1: Introduction to HTML

Unit 2: Introduction to HTML Lab.

Unit 3: HTML Features

Unit 4: HTML Features Lab.

Unit 5: HTML Authoring

Booklet 2: JavaScript

Unit 1: JavaScript Fundamentals

Unit 2: JavaScript Fundamentals Lab.

Unit 3: JavaScript Object Models

Unit 4: JavaScript Object models Lab

Unit 5: Advanced JavaScript

Unit 6: Advanced JavaScript Lab

This course includes labs and quizzes

### Agenda

Each unit in this course is two hours in duration.

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## Web Programming 2 (ASP, CGI, VBScript) (CY720) V1

### Duration

The duration of the course is 32 hours.

### Purpose

## **e-Business Application Developer Course Descriptions**

This course offers students an overview of VBScript. The first part of the course introduces programming with VBScript, along with some of the preliminary concepts like VBScript variables, operators, control structures and procedures. the course also covers ActiveX controls, Objects and creating cookies with VBScript.

The second part of the course provides an overview of the common gateway interface. Students will learn CGI fundamentals, features of the Perl scripting language, Perl operators, conditionals and loops. This part of the course also teaches pattern matching, working with form data and session management with cookies.

The third part of the course offers an overview of Active Server Pages. Students will learn the ASP syntax, how to create ASP scripts and how an ASP file works. They will also learn objects and session management. The course teaches application objects, ASP components, debugging and error- handling.

The course incorporates several lab sessions where students will be able to gain practical experience on Web Programming.

### **Audience**

This course is designed for application developers who want to gain practice on Web programming.

### **Prerequisites**

Students attending this course should be familiar with OO Programming and Java

### **Objectives**

After completing this course, you should be able to:

- Declare variables and arrays, and explain conditional statements
- Discuss sub-routines and functions
- Define cookies and explain how to manage cookies, using VBScript
- Discuss how to communicate with ActiveX controls
- Discuss the need for CGI in web application development
- Discuss how CGI and Perl are related
- Explain how to create ASP
- Explain how to work with ASP objects and collections
- State ASP can be used for session management
- Describe server objects, and their instantiation
- Discuss ASP preprocessing directives and SSIs

### **Agenda**

Each unit in this course is two hours in duration.

## Module 5 – Enterprise Application Development

### *e-Business Technology Fundamentals (CY750) V2*

**Duration**

The duration of the course is 16 hours.

**Purpose**

This course offers students an overview of e-Business fundamentals and the various e-Business technologies. The courseware is divided into two volumes for easier reading.

The first volume of this course deals with e-Business – definitions and the use and need for e-Business. Other e-Business concepts discussed are business patterns and solution spaces, how to transform an existing business into an e-Business, and the characteristics of successful e-Business applications. The concept of a design space in e-Business building blocks is also discussed.

This volume also talks about fundamental e-Business technologies and the concept of pervasive computing. Other topics covered include client building blocks, client side processing, server side processing, HTTP basic flow, basic applications of the Internet, using ISP to access a network, the need for intranets and extranets, the World Wide Web, connectors and data structures, Java Database Connectivity (JDBC), and network security issues.

The second volume gives an overview of Customer Relationship Management (CRM). It differentiates between Common Object Request Broker Architecture (CORBA) and Enterprise JavaBeans (EJBs). It deals with e-Commerce, and the ways in which an application communicates with another application, the functionality of a message broker, etc. It also gives the definition of an e-marketplace. Besides, this volume also provides a definition of business intelligence, a description of data warehousing, differentiates between a data warehouse and a data mart, the different decision support tools, the types of data analysis tools, and also multidimensional data analysis.

**Audience**

This course is designed for application developers who want to gain practice on e-business application programming.

**Prerequisites**

CY710 or CY500

**Objectives**

After completing this course, you should be able to:

- Define and describe e-Business
- Discuss how to transform an existing business into an e-Business
- Discuss the concept of a design space within an e-Business building block
- Discuss the different e-Business technologies
- Define pervasive computing
- Describe client side and server side processing
- Discuss the need for intranets and extranets
- Discuss the different aspects of network security
- Explain performance issues in networks as well as in servers
- Discuss Customer Relationship Management (CRM)
- Differentiate between CORBA and EJB
- Define e-Commerce and differentiate between the types of e-Commerce
- Discuss about online auctions and the different online payment modes
- Differentiate between B2B and B2C
- Define business intelligence
- Define a data warehouse and state how it is different from a data mart
- Describe the different decision support tools
- List the types of data analysis tools
- Define multi-dimensional data analysis

**Agenda**

Each unit in this course is two hours in duration.

### *e-Commerce Strategies and Practices Lecture Only (CY555) V2*

**Duration**

The duration of the course is 18 hours.

**Purpose**

This course teaches students how to conduct business online and how to manage the technological issues associated with constructing an electronic-commerce Web site. Students will implement a genuine transaction-enabled business-to-consumer Web site, examine strategies and products available for building electronic-commerce sites, examine how such sites are managed, and explore how they can complement an existing business infrastructure. Students get hands-on experience implementing the technology to engage cardholders, merchants, issuers, payment gateways and other parties in electronic transactions.

**Audience**

Network server administrators, firewall administrators, systems administrators, application developers, IT security officers and Webmasters



## e-Business Application Developer Course Descriptions

### Prerequisites

Students must have Internet Fundamentals and Networking Essentials knowledge or equivalent experience.

### Objectives

- Define e-commerce, and discuss its trends and statistics.
- Explain the legal aspects of e-commerce, including jurisdiction, copyright and patents.
- Identify and describe e-commerce marketing goals.
- Explain usability and discuss the factors that affect it.
- Define e-services and formulate an e-service action plan.
- Explain Electronic Data Interchange (EDI) and its role in e-commerce.
- Define e-business and the role it plays in current business.
- Explain interoffice resources for increased productivity and cost reduction.
- Distinguish between e-commerce software options, and weigh their advantages and disadvantages.
- Install and customize an e-commerce site with a product catalog using software applications.
- Install and verify a payment gateway for transaction processing.
- Administer payment transactions for the batching process.
- Identify major components of e-commerce security.
- Generate a certificate request for a trusted third-party certificate authority.
- Install a server certificate.
- Develop a fully transaction-enabled e-commerce Web site.

Electronic Commerce Foundations  
Law and the Internet

Web Marketing Goals

Online Product Promotion  
Site Usability  
Customer Relationship Management (CRM)  
and E-Services  
Business-to-Business Frameworks  
E-Commerce Site Creation Packages -  
Outsourcing

E-Commerce Site Creation Software  
Site Development Software Implementation -  
Microsoft Platform  
E-Commerce Site Development Using  
Commerce Server  
Creating an Online Catalog  
Payment Gateways  
E-Services Support  
Transaction Security  
Web Site Management and Performance  
Testing

### Agenda

Each unit in this course is two hours in duration.

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## Enterprise Java I (CY760) V2

### Duration

The duration of the course is 60 hours.

### Purpose

This course is targeted at students who will be developing and testing server-side applications based on the Java 2 Enterprise Edition (J2EE) component model. They will be learning to build web based J2EE applications with WebSphere Studio Application Developer (WSAD). The J2EE applications will be deployed on WebSphere Application Server (WAS). The students will also learn how to develop JDBC code to access relational databases using data sources.

This course introduces JavaBeans and delves into the JavaBeans component model. It also describes how to build JavaBeans to work with application builders. It gives an introduction to distributed computing and discusses its core concepts.

The course gives an introduction to server-side development and discusses in detail the various aspects of web application development using servlets and JSPs. They would be learning to deploy and configure web applications.

This course introduces the WebSphere Application Server (WAS). It illustrates how to deploy web components on WAS.

The student labs are done using WebSphere Studio Application Developer (WSAD) and students will spend a lot of time testing their code in WebSphere Test Environment. The JSP labs also make use of WSAD. Some of the later labs will deploy web components into the WebSphere Application Server.

### Audience

Students, Professionals, and Business people

### Prerequisites

Knowledge of Java programming and DB2 programming

### Objectives

At the end of this course, you will be able to:

- Work with WebSphere Studio Application Developer
- Describe the benefits of Java 2 Enterprise Edition (J2EE) architecture
- Create, configure and use data sources
- Design and develop Java servlets
- Design and develop JSPs
- Build and test server-side logic that is thread-safe in a concurrent web application environment
- Manage end-user state



## e-Business Application Developer Course Descriptions

- Create basic session and entity EJBs
- Use the Application Assembly Tool
- Assemble web components into web modules
- Deploy web components using WAS

### Agenda

Each unit in this course is two hours in duration.

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### ***Enterprise Java II (CY765) V2***

#### **Duration**

The duration of the course is 42 hours.

#### **Purpose**

This course is targeted at students who will be developing and testing server-side applications based on the Java 2 Enterprise Edition (J2EE) component model. They will be learning to build J2EE applications with WebSphere Studio Application Developer (WSAD). The J2EE applications will be deployed on WebSphere Application Server (WAS).

The course gives an introduction to server-side development and discusses in detail the various aspects of EJB development. The examples in this course illustrate the capabilities of the various types of EJBs.

This course also allows the students to get acquainted with services (Directory, Connection pooling, Transaction, Security) provided for J2EE applications. They would be learning to deploy and configure J2EE applications.

This course introduces the WebSphere Application Server (WAS). It illustrates how to deploy EJBs onto WAS and gives an overview of WAS administration. It also gives a few tips on performance tuning.

The student labs are done using WebSphere Studio Application Developer (WSAD) and students will spend a lot of time testing their code in WebSphere Test Environment. For EJBs, the students will use the EJB development tools and test using the WebSphere Test Environment and EJB test client. They will also deploy EJBs onto WebSphere Application Server.

#### **Audience**

Students, Professionals, and Business people

#### **Prerequisites**

Knowledge of Java programming, DB2 programming distributed computing and basic knowledge of J2EE architecture.

#### **Objectives**

At the end of this course, you will be able to:

- Create basic session and entity EJBs
- Access container and server services from enterprise documents
- Implement Java clients calling EJBs
- Build EJBs that satisfy transactional requirements
- Manipulate transactional behavior using deployment descriptor
- Deploy enterprise components onto the server
- Use the Application Assembly Tool
- Assemble EJB components, and client application components into enterprise applications
- Deploy EJBs using WAS
- Configure resource and security-role references
- Use tracing tools Work in a team environment using CVS

#### **Agenda**

Each unit in this course is two hours in duration.

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### ***Enterprise Application Development Using XML (CY730) V2***

#### **Duration**

The duration of the course is 44 hours.

#### **Purpose**

This course offers students an overview of development using XML. The first volume of the course deals with the XML syntax and its advantages. It also covers the features of Document Type Definition. Students will understand the purpose of DTDs, symbols of DTDs, and their meanings. They will also learn how to create the DTD for an existing XML file.

The second volume of the course deals with XML namespaces, namespace scope and processing and the problems related to namespaces. It also provides an overview of the features of XML Schema, various XML Schema elements, and how to create XML Schema files.

The third volume of the course relates to XML transformations, XSLT elements and their usage. It teaches how to transform simple XML documents using XSL. Students will learn about XPath, their functions and uses. They will also learn about the XSLT elements related to conditional processing.

The fourth volume of the course deals with the Document Object Model. It provides an introduction to parsers, the standard set of parsers available, and the DOM parser. Students will learn about the history of SAX, its fundamentals, and the event-driven model of SAX. They will also learn about how SAX parsers work, SAX interfaces and the methods associated with them.

## **e-Business Application Developer Course Descriptions**

The fifth volume of the course provides an overview of databases with XML and web services. It provides an introduction to XML and databases, the advantages of using the n-tier approach and using XML in an n-tier application. It teaches about the XML Query Language and XQL patterns. Students will be introduced to web services, its architecture, and advantages. They will also learn about Simple Object Access Protocol, its building blocks and implementation through Java.

The course incorporates several Lab sessions where students would be able to gain practical experience in developing XML and web services.

### **Audience**

This course is designed for application developers who want to gain practice on Web programming.

### **Prerequisites**

CY710, CY420, CY350

### **Objectives**

After completing this course, you should be able to:

- Define and describe e-Business
- Discuss how to transform an existing business into an e-Business
- Discuss the concept of a design space within an e-Business building block
- Discuss the different e-Business technologies
- Define pervasive computing
- Describe client side and server side processing
- Discuss the need for intranets and extranets
- Discuss the different aspects of network security
- Explain performance issues in networks as well as in servers
- Discuss Customer Relationship Management (CRM)
- Differentiate between CORBA and EJB
- Define e-Commerce and differentiate between the types of e-Commerce
- Discuss about online auctions and the different online payment modes
- Differentiate between B2B and B2C
- Define business intelligence
- Define a data warehouse and state how it is different from a data mart
- Describe the different decision support tools
- List the types of data analysis tools
- Define multi-dimensional data analysis

### **Agenda**

Each unit in this course is two hours in duration, except the last unit, which is of 4 hours duration (Comprehensive Lab.).

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## ***e-Business Security (CY740) - AVAILABLE IN August 2003***

### **Duration**

The duration of the course is 32 hours. (final duration to be defined in late June 2003)

### **Purpose**

This course is an overview of standards and technologies which exist to secure networks and users connected to the Internet.

### **Audience**

Students, Professionals, and Business people

### **Prerequisites**

None

### **Objectives**

- Identify the components of Security
- Identify the risks involved in connecting to the Internet and understand the concept and the opportunity of a Security Policy
- Understand the tools supplied by Cryptography for Network Security
- Understand the services provided by Network Security Standards
- Understand the importance and the complexity of the Legal Issues of e-business

### **Agenda**

Each unit in this course is two hours in duration.

## e-Business Application Developer Course Descriptions

### Breakdown of Hours by Course (Lecture and Lab)

Title	Dur	Lecture	Lab
<b>Introduction to PCs &amp; MS Windows</b>	12	7	5
Volume			
Unit 1: Introduction to PCs		2	
Unit 2: Windows 2000 Fundamentals		1	
Unit 3: Windows 2000 Fundamentals Lab.			1
Unit 4: Working with Files and Folders		1	
Unit 5: Working with Files and Folders Lab.			1
Unit 6: Working with Editors		1	
Unit 7: Working with Editors Lab.			1
Volume			
Unit 1: Customizing Windows 2000		1	
Unit 2: Customizing Windows 2000 Lab.			1
Unit 3: Optimization and Maintenance		1	
Unit 4: Optimization and Maintenance Lab.			1
<b>Computer Architecture &amp; Operating Systems</b>	28	26	2
Volume			
Unit 1: Computer Organization		2	
Unit 2: Digital Logic		2	
Unit 3: Number Systems - Integer Representation		2	
Unit 4: Number Systems - Real Number Representation		2	
Unit 5: Number Systems Lab			2
Volume			
Unit 1: CPU & Memory Organization		2	
Unit 2: Input/Output Organization		2	
Unit 3: RISC and CISC Architecture		2	
Volume			
Unit 1: Overview of Systems Programming		2	
Unit 2: Overview of Operating Systems		2	
Volume			
Unit 3: Process Management		2	
Unit 4: Memory Management		2	
Unit 5: File Management		2	
Unit 6: Device Management		2	
<b>Linux Basics</b>	26	16	10
Volume			
Unit 1: Linux Fundamentals		2	
Unit 2: The Linux System		2	
Unit 3: The Linux System Lab.			2
Unit 4: Linux File Structure		2	
Unit 5: Linux File Structure Lab.			2
Unit 6: The vi Editor		2	
Unit 7: The vi Editor Lab.			2
Volume			
Unit 1: Shell Basics		2	
Unit 2: Shell Basics Lab.			2
Unit 3: Shell Features		2	
Unit 4: Shell Features Lab.			2
Unit 5: Processes in Linux		2	
Unit 6: Customizing the User Environment		2	
<b>Internet Fundamentals**</b>	6	6	0
Volume			
Unit 01: Overview of the Internet		0.5	
Unit 02: Browsing the World Wide Web		0.5	
Unit 03: E-Mail		0.5	
Unit 04: FTP, Newsgroups, and Telnet		0.5	
Unit 05: Objects, Plug-ins, and Viewers		1	
Unit 06: Search Engines		1	
Unit 07: Security		1	

## e-Business Application Developer Course Descriptions

Unit 08: E-Commerce		1	
<b>Programming Fundamentals</b>	16	16	
Volume			
Unit 1 - Computer Programs		2	
Unit 2 - Structured Design Concepts		2	
Unit 3 - Logic		2	
Unit 4 - Flow Charting		2	
Unit 5 - Pseudocode		2	
Unit 6 - Data Representation		2	
Unit 7 - Input and Output		2	
Unit 8 - Data Processing Examples (Optional)		2	
<b>Introduction to Programming with C</b>	56	30	26
Volume			
Unit 1: Introduction to Computing		2	
Unit 2: Introduction to Computing Lab.			2
Unit 3: Programming in C - The First Steps		2	
Unit 4: Building a Strong Foundation in C		2	
Unit 5: Programming in C Lab.			2
Volume			
Unit 1: Decision Control Structure		2	
Unit 2: Decision Control Structure Lab.			2
Unit 3: Iterative Constructs		2	
Unit 4: Iterative Constructs Lab.			2
Unit 5: More Iterative Constructs		2	
Unit 6: More Iterative Constructs Lab.			2
Volume			
Unit 1: Programming with Arrays		2	
Unit 2: Multi-Dimensional Arrays		2	
Unit 3: Programming with Arrays Lab.			2
Unit 4: Structures		2	
Unit 5: Structures Lab.			2
Volume			
Unit 1: Functions		2	
Unit 2: Functions Lab.			2
Unit 3: Recursion		2	
Unit 4: Recursion Lab.			2
Volume			
Unit 1: Pointers		2	
Unit 2: Pointers Lab.			2
Unit 3: Advanced Pointers		2	
Unit 4: Advanced Pointers Lab.			2
Volume			
Unit 1: File Handling in C		2	
Unit 2: File Handling in C Lab.			2
Unit 3: Additional Features of C		2	
Unit 4: Advanced Topics Lab.			2
<b>Data Structures and Algorithms</b>	32	18	14
Volume			
Unit 1: Data Structures and Analysis of Algorithms		2	
Unit 2: Linked List		2	
Unit 3: Linked List Lab.			2
Unit 4: Stack		2	
Unit 5: Stack Lab.			2
Unit 6: Queue		2	
Unit 7: Queue Lab.			2
Volume			
Unit 1: Graphs		2	
Unit 2: Trees		2	
Unit 3: Simple Sorting Techniques		2	
Unit 4: Simple Sorting Techniques Lab.			2
Unit 5: Advanced Sorting Techniques		2	
Unit 6: Advanced Sorting Techniques Lab.			2
Unit 7: Searching Techniques		2	

## e-Business Application Developer Course Descriptions

Unit 8: Searching Techniques Lab.			2
Unit 9: Hash Table Lab.			2
<b>RDBMS Concepts</b>	32	18	14
Volume			
Unit 1: Introduction to RDBMS		2	
Unit 2: Entity Relationship Diagram		2	
Unit 3: Database Normalization		2	
Unit 4: Database Design Lab.			2
Volume			
Unit 1 - Structured Query Language - Fundamentals		2	
Unit 2: SQL Fundamentals Lab.			2
Unit 3: Advanced SQL		2	
Unit 4: Advanced SQL Lab.			2
Volume			
Unit 1: DB2 Fundamentals		2	
Unit 2: DB2 UDB Tools Lab.			2
Unit 3: Creating and Managing Database Objects		2	
Unit 4: Database Objects Lab.			2
Unit 5: Data Dictionary, Database Access and Security		2	
Unit 6: Data Dictionary Lab.			2
Unit 7: Programming Structure, UDT and UDF		2	
Unit 8: Programming Structure, UDT and UDF Lab.			2
<b>Networking Essentials</b>	16	14	2
Volume			
Unit 1: ISO-OSI Layers		2	
Unit 2: Internet Protocol		2	
Unit 3: IP Protocol Lab.			2
Unit 4: Transmission Control Protocol		2	
Unit 5: Network and Application Layer Protocols		2	
Unit 6: Sockets and Remote Procedure Call		2	
Volume			
Unit 1: Network Devices		2	
Unit 2: Network Management Fundamentals		2	
<b>Object Oriented Programming with C++</b>	60	34	26
Volume			
Unit 1: Overview of Object Oriented Concepts		2	
Unit 2: Classes and Objects		2	
Unit 3: Classes and Objects Lab.			2
Unit 4: Applying Object Oriented Concepts		2	
Unit 5: Applying Object Oriented Concepts Lab.			2
Volume			
Unit 1: C++ is Better than C		2	
Unit 2: Classes and Objects		2	
Unit 3: More of Classes and Objects		2	
Unit 4: Classes and Objects Lab.			2
Unit 5: Inheritance		2	
Unit 6: Inheritance Lab.			2
Unit 7: Constants and References		2	
Unit 8: Constants and References Lab.			2
Volume			
Unit 1: Polymorphism and Virtual Functions		2	
Unit 2: Polymorphism and Virtual Functions Lab.			2
Unit 3: Operator Overloading		2	
Unit 4: Operator Overloading Lab.			2
Unit 5: Multiple Inheritance and RTTI		2	
Unit 6: Multiple Inheritance Lab.			2
Volume			
Unit 1: Templates		2	
Unit 2: Templates Lab.			2
Unit 3: Advanced Templates		2	
Unit 4: Advanced Templates Lab.			2
Unit 5: Raising and Handling Exceptions		2	
Unit 6: Raising and Handling Exceptions Lab.			2

## e-Business Application Developer Course Descriptions

Unit 7: Creating Own Exceptions	2		
Unit 8: Creating Own Exceptions Lab		2	
Volume			
Unit 1: C++ Streams	2		
Unit 2: I/O on User Defined Class	2		
Unit 3: Input and Output Lab.		2	
<b>Core Java</b>	88	48	40
Volume			
Unit 1: Overview of Java	2		
Unit 2: Operators, Expressions and Control Flow	2		
Unit: 3 Operations, Expressions and Control Flow Lab.		2	
Volume			
Unit 1: Classes, Objects and References	2		
Unit 2: Classes, Objects and References Lab.		2	
Unit 3: Inheritance	2		
Unit: 4 Inheritance Lab.		2	
Unit 5: Abstract Classes and Interfaces	2		
Unit 6: Abstract Classes and Interfaces Lab.		2	
Unit 7: Packages	2		
Volume			
Unit 1: Exception Handling and Types of Exceptions	2		
Unit 2: Raising & Handling Exceptions	2		
Unit 3: Raising and Handling Exceptions Lab.		2	
Volume			
Unit 1: Files and Streams	2		
Unit 2: Files and Streams Lab.		2	
Unit 3: Object Serialization	2		
Unit 4: Object Serialization Lab.		2	
Volume			
Unit 1: AWT Components and Containers	2		
Unit 2: AWT Components and Containers Lab.		2	
Unit 3: Layout Managers	2		
Unit 4: Layout Managers Lab.		2	
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